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SUPPORTING INFORMATION

Enhancing Interfacial Contact and Photocatalytic Performance of TiO_2/Nanocarbon Hybrids through Coupling with Short Nanotubes

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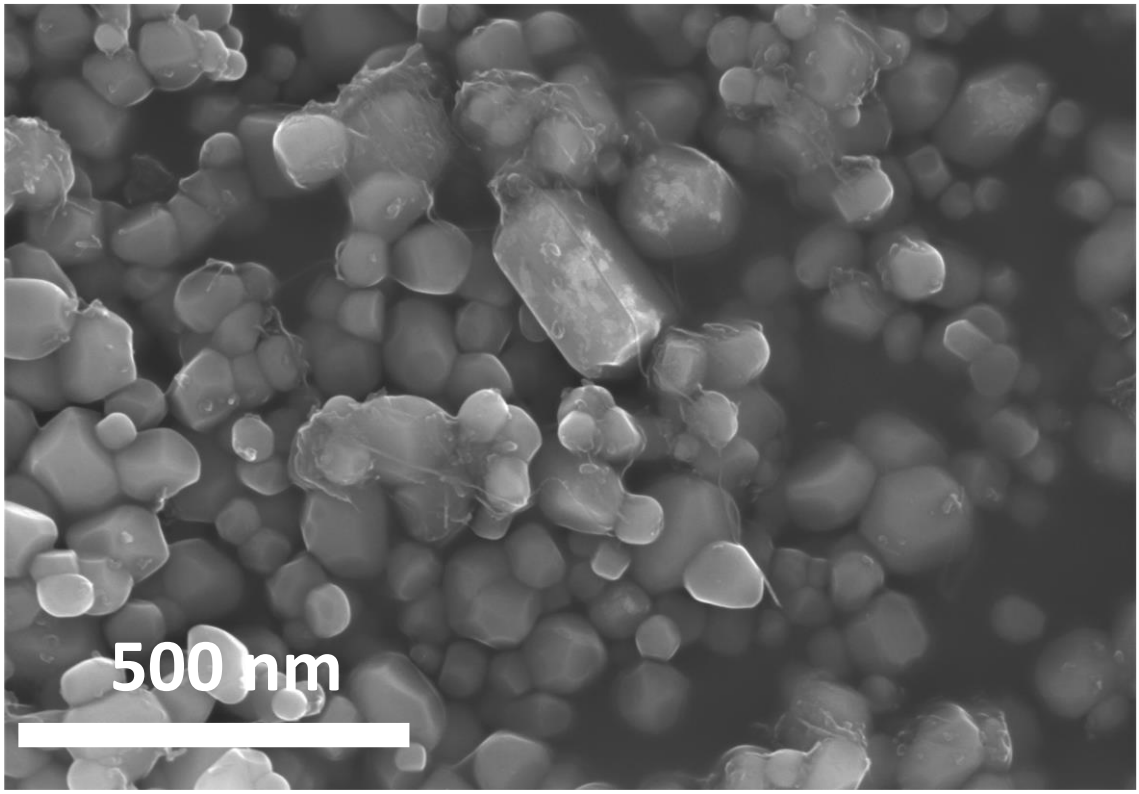

Fig. S1. Low-magnification SEM image of TiO_2-short SWCNT. Weight ratio of SWCNTs is 1 wt. % of TiO_2

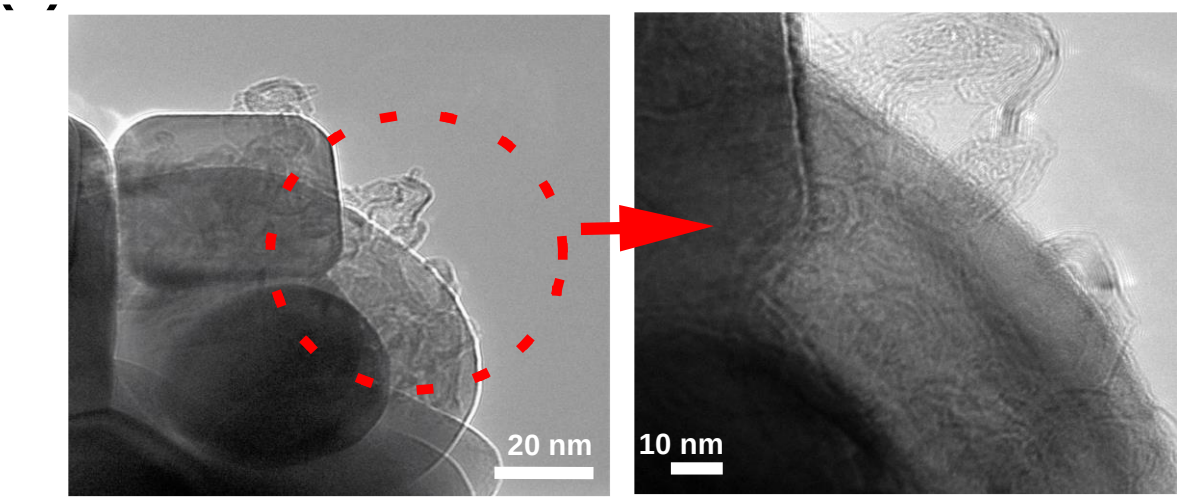

Fig. S2. HR-TEM image of TiO_2-short SWCNT. Weight ratio of SWCNTs is 1 wt. % of TiO_2.

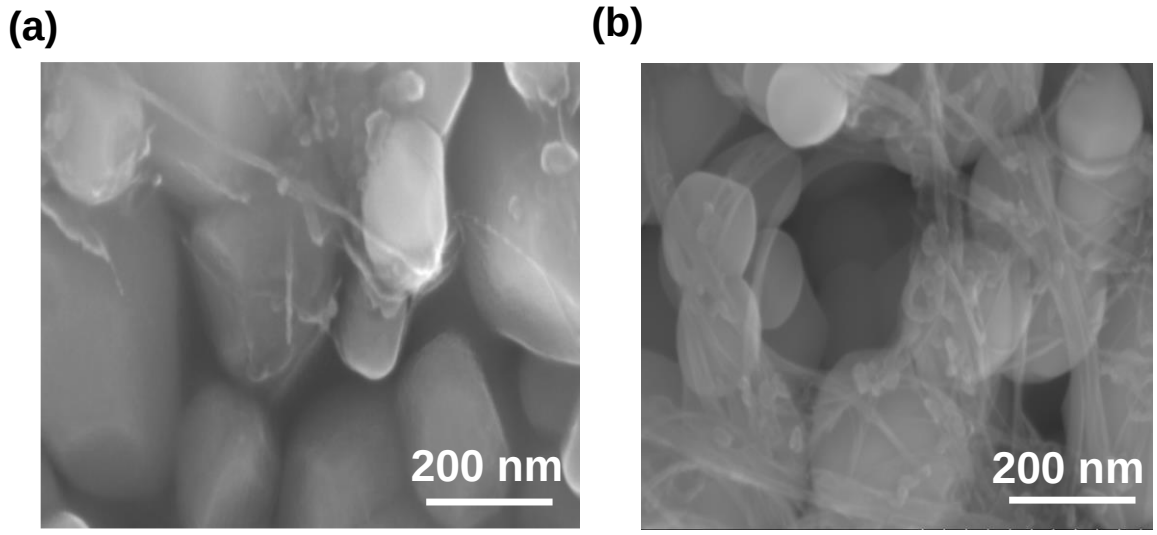

Fig. S3. SEM images of TiO_2-short SWCNT composites with different loading of short SWCNTs: (a) 1 wt. % and (b) 3 wt. %.

Optical Properties

Fig. S2 shows diffuse reflectance absorption spectra for TiO_2 and TiO_2-short SWCNT hybrid. The samples show the expected absorption with a strong transition in the UV region that is attributed to the intrinsic band gap of TiO_2 and associated transition of electrons from the valance band to conduction band. TiO_2-short SWCNT gives rise to an increase of light absorption in the visible region with a slight red shift of the absorption edge. The band gaps of TiO_2 (3.22 eV) and TiO_2-SWNTs (3.19 eV) were calculated via using Tauc's plot, according to literature. [1,2]

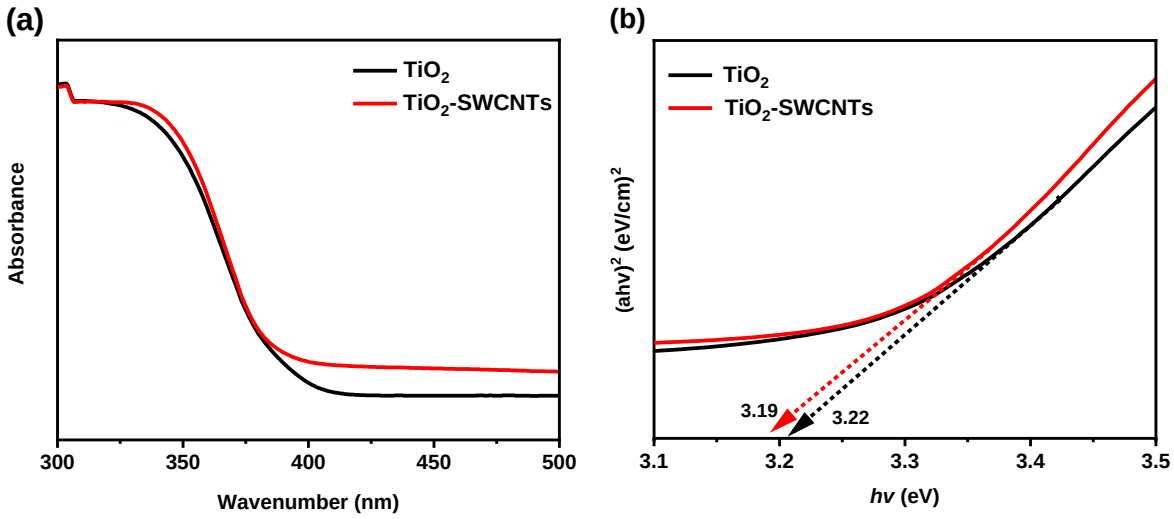

Fig. S4. (a) UV-Vis spectra of TiO_2 and TiO_2-short SWCNT (b) Tauc's plot of TiO_2 and TiO_2-short SWCNT. SWCNTs weight ratio is 1 wt. % of TiO_2**.**

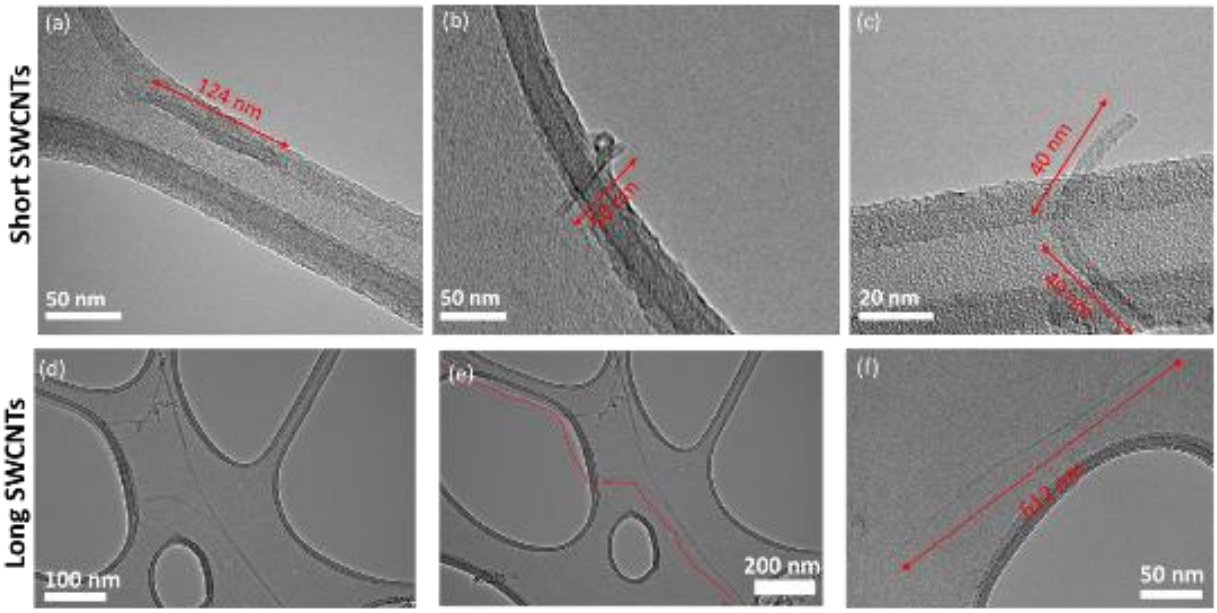

Fig. S5. Representative TEM images of short SWCNTs (a, b, and c) and long SWCNTs (d, e and f).

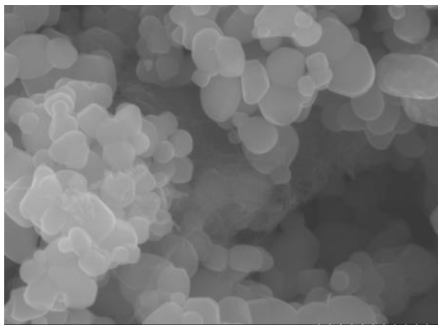

Fig. S6. SEM image of TiO_2-long SWCNT composite. SWCNTs weight ratio is 1 wt. % of TiO_2

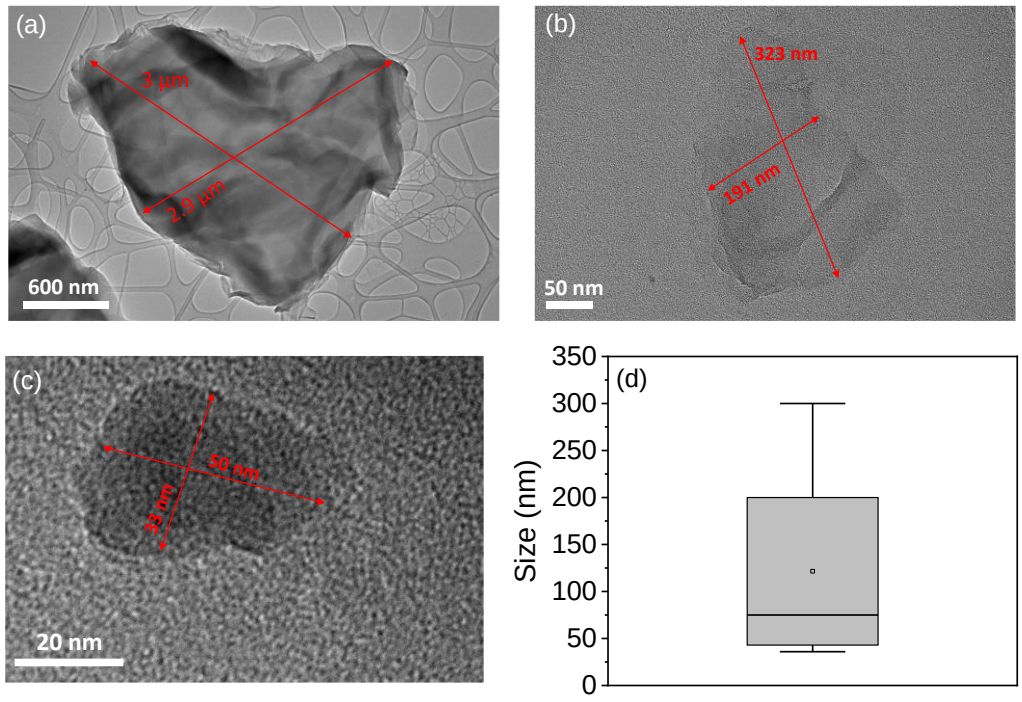

Fig. S7. TEM images of (a) microsized graphene oxide, (b) exfoliated nanographene oxide, and (c) non-exfoliated nanographene oxide. (d) A box plot of the size of nanographene oxide. Average size is 125±86 nm.

References

N. Serpone, D. Lawless, R. Khairutdinov, *J. Phys. Chem.* **1995**, *99*, 16646. [1]

A. A. Valeeva, E. A. Kozlova, A. S. Vokhmintsev, R. V Kamalov, I. B. Dorosheva, A. A. Saraev, I. A. Weinstein, A. A. Rempel, *Sci. Rep.* **2018**, *8*, 9607. [2]